

## WE CLAIM

1. A method for stepless capacity control of a reciprocating piston compressor whereby an unloader (2) arranged on at least one automatic suction valve (1) of the compressor keeps open at least one sealing element (5) of said suction valve (1) throughout a thereby controllable portion of the working cycle of the compressor through a switchable control valve (3) having an unloading piston (4) biased by gas pressure, wherein the gas pressure biasing said unloading piston (4) is always above the gas pressure required to overcome the maximum possible reverse flow force during the time in which said control valve (3) is closed, and wherein controllable partial discharge of the unloading cylinder (6) is performed until the closing of said suction valve (1) through a control valve that is designed for rapid switching in each phase of the working cycle.

2. A method according to claim 1, wherein there is a dependency

- a) in volume to be discharged consisting of the stroke volume of the unloading cylinder (6) and the clearance volume between the control valve (3) and the unloading piston (4),
- b) the cross section of the opening of the control valve (3)
- c) the gas used for actuation of the unloader (2) whereby the theoretic discharge time of the entire volume to be discharged is maximal nearly equal or less then twice the duration of a working cycle of the compressor.

3. A reciprocating piston compressor with stepless capacity control having an unloader (2) attached on at least one automatic suction valve (1) of the compressor whereby said unloader (2) keeps open at least one sealing element (5) of said suction valve (1) throughout a thereby controllable portion of the working cycle of the compressor by

means of an unloading piston (4) biased by gas pressure via a switchable control valve (3), wherein there is a dependency

a) in volume to be discharged consisting of the stroke volume of the unloading cylinder (6) and the clearance volume between the control valve (3) and the unloading piston (4),

b) the cross section of the opening of the control valve (3),

c) the gas used for actuation of the unloader (2) whereby the theoretic discharge time of the entire volume to be discharged is maximal nearly equal or less then twice the duration of a working cycle of the compressor.

4. A compressor according to claim 3, whereby the clearance volume between control valve (3) and unloading piston (4) is maximal nearly equal or smaller than twice the stroke volume of said unloading cylinder (6).

5. A compressor according to claim 3, whereby the guide of said unloader (2) forms one structural unit together with the unloading cylinder (6) and/or the unloading piston (4).

6. A compressor according to claim 5, whereby said control valve (3) forms one structural unit together with at least one of the unloading cylinder (6) and unloading piston (4).

7. A compressor according to claim 6, whereby said control valve (3) is designed as a solenoid-actuated 3/2-port directional control valve and is preferably switched in such a manner that it acts upon the unloading cylinder (6) with gas pressure while being without electric power.

8. A compressor according to claim 7, whereby said control valve (3) is biased at the inlet side with a processing gas being under a

corresponding pressure, whereby said control valve is preferably connected to a reservoir volume which is connected in turn to the working chamber of the compressor via a check valve (28).

9. A compressor according to claim 8, whereby said unloading piston (4) partially shuts off in its end position the inlet and/or the discharge of the gas biasing said unloading cylinder (6).